EXECUTIVE SUMMARY

An aquatic macrophytes (plants) field study in Parker Lake was conducted during August 2005 by a staff member of the Adams County Land and Water Conservation Department, using the transect survey method. Results were shared with the Wisconsin Department of Natural Resources. A follow-up transect survey was conducted by staff of the Adams County Land & Water Conservation Department in the summer of 2010. A second aquatic plant survey, using the Point Intercept method, was also conducted during the summer of 2010 by Adams County Land & Water Conservation staff.

Parker Lake is located in the Town of Jackson, Adams County, Wisconsin. The natural seepage lake is 60 surface acres in size. Maximum depth is over 35 feet, with an average depth of 13'. About 21% of the lake is over 20' deep. The shoreline is 1.16 miles, with some disturbance at most of it. `There is a public wayside (1300' of shore) located on the north side of the lake with a concrete path leading to the water. Although there is no public boat launch, the Parker Lake Lodge permits boats to be launched for a fee of $4.

Parker Lake is easily accessible off of State Highway 82. Residential development in both the surface and groundwatersheds is concentrated along the lakeshore. The surface watershed is about ½ agriculture and ½ woodland use. There are both terrestrial and aquatic Natural Heritage Communities directly south of the lake. Waterfowl, especially ducks, use this lake during spring and fall.

According to Secchi disk readings for water clarity, plus laboratory testing for total phosphorus and chlorophyll-a, Parker Lake scores as "mesotrophic" in its phosphorus

levels and “oligotrophic” in water clarity and chlorophyll a readings. This state would favor moderate plant growth, occasional algal blooms and very good water clarity.

In the 2005 aquatic plant survey, *Myriophyllum spicatum* (Eurasian watermilfoil), an exotic invasive, was the most frequently-occurring aquatic plant and dominated the aquatic plant community. Since that time, the Parker Lake Association gained permission to chemically treat this exotic. Allthough *Myriophyllum spicatum* was not found in the 2010 surveys, there is a report that a hybrid of the native *Myriophyllum sibiricum* and the exotic *Myriophyllum spicatum* has been found in Parker Lake. This can only be verified by DNA testing.

In the 2010 transect survey, 30 aquatic species were found. Of these, 29 were native species: 14 emergents; 2 floating-leaf rooted plants; 2 free-floating species; 10 were submergents; and 1 was a plant-like algae (*Chara)*. In addition, one invasive emergent plant was found in 2010: *Phalaris arundinacea* (which was found in 2005). The 2010 Point Intercept (PI) survey was conducted during July 2010. 28 aquatic species were found. Of these, 27 were native species. One freshwater sponge was found and the macrophytic algae, *Chara*, were also found. The remaining native species were divided into 10 emergents, 2 floating-leaf rooted plants, 2 free-floating aquatic plants, and 11 were submergents. The invasive *Phalaris arundinacea* was also present in the 2010 PI survey.

In the 2010 transect survey, the aquatic species with the highest frequency of occurrence was the macrophytic algae, *Chara* spp (muskgrass). In the 2010 PI survey, only *Chara* spp had an occurrence frequency over 50%. *Chara* spp was found at nearly 2/3 of the PI sites in 2010. In both 2010 surveys, *Chara* spp had the highest mean density. In the 2010 transect survey, *Chara* spp had a more than average density of growth, but in the 2010 PI survey, it did not. In both 2010 aquatic plant surveys, *Chara* spp. was the dominant aquatic species by far.

The 2010 transect Simpson's Diversity Index score for Parker Lake was .87, suggesting fair species diversity. However, the 2010 PI survey scored only .79, which is a very poor level of diversity. The difference can probably be accounted for by the few shallow sampling points in the PI survey and the geographic structure of Parker Lake itself. The PI points were gridded 30 meters apart (just over 98 feet). In a kettle lake like Parker, depth can go from 1.1 feet to 26 feet in that distance, leaving any plants between the 1.1 foot depth and 26 feet uncounted. In the transect survey, where sample sites are determined by depth zone, rather than a geographic grid, depths between 1.1 and 20 feet are sampled.

The Aquatic Macrophyte Community Index (AMCI) for the 2010 transect survey of Parker Lake is 62, up 5 points from the 2005 figure of 57. This 2010 figure is above the average range for North Central Wisconsin Hardwood Lakes and all Wisconsin lakes, while the 2005 was within the average range. The AMCI for the 2010 PI aquatic plant survey was 69. This, too, is above the average range for North Central Hardwood Forests and for all Wisconsin lakes.

MANAGEMENT RECOMMENDATIONS

(1) Natural shoreline restoration is much needed at Parker Lake. Disturbed shorelines cover too much of the current shoreline, especially with many buildings less than 50 feet from the ordinary high water mark and a number of easily-eroded sand beaches also found. A buffer area of native plants should

be restored around the lake, especially on those sites that now have traditional lawns mowed to the water's edge or buildings very close to the water's edge.

(2) No lawn chemicals should be used on properties around the lake. If they must be used, they should be used no closer than 50 feet to the shore.

(3) The aquatic plant management plan that was developed as part of the lake management plan needs to be revised to cover recurrence of Eurasian watermilfoil, curly-leaf pondweed, or any new invasives, including a potential hybrid of Eurasian watermilfoil and Northern milfoil. The lake management plan was submitted 2 years ago to the Wisconsin Department of Natural Resources, but approval has not yet been granted.

(4) If invasives recur, The Parker Lake Association should apply for grants from the Wisconsin Department of Natural Resources to help defray the cost of aquatic plant management.

(5) No broad-scale chemical treatments of native aquatic plant growth are recommended due to the undesirable side-effects of such treatments, including increased nutrients from decaying plant material and decreased dissolved oxygen and opening up more areas to the invasion of EWM.

(6) Fallen trees should be left at the shoreline.

(7) Parker Lake residents should continue to be involved in the Wisconsin Self-Help Monitoring Program to permit on-going monitoring of the lake trends for

basically no cost. This should include monitoring for known invasives and a possible hybrid milfoil.

(8) Parker Lake residents should identify, cooperate with and participate in watershed programs that will reduce nutrient and sediment inputs.

(9) Emergent vegetation and lily pad beds should be protected where it is currently present and re-established where it is not. These not only provide habitat, but also help stabilize the sandy shores.

(10) The areas where there is undisturbed wooded shore should be maintained and left undisturbed.

(11) Once the lake management plan has been approved by the WDNR, the Parker Lake Association should develop and implement a lake management plan that takes into account all inputs from both the surface and ground watersheds and addresses the concerns of this lake community.

(12) The Parker Lake Association, with the assistance of the Adams County Land & Water Conservation Department, the Adams County Highway Department, the Wisconsin Department of Transportation and the Town of Jackson should develop and implement protective measures to reduced runoff from State Highway 82 and local road 3rd Avenue into Parker Lake.

THE AQUATIC PLANT COMMUNITY FOR PARKER LAKE
ADAMS COUNTY 2005-2010

I. INTRODUCTION

An aquatic macrophytes (plants) field study in Parker Lake was conducted during August 2005 by a staff member of the Adams County Land and Water Conservation Department, using the transect survey method. Results were shared with the Wisconsin Department of Natural Resources. A follow-up transect survey was conducted by staff of the Adams County Land & Water Conservation Department in the summer of 2010. A second aquatic plant survey, using the Point Intercept method, was also conducted during the summer of 2010 by Adams County Land & Water Conservation staff.

Information about the diversity, density and distribution of aquatic plants is an essential component in understanding the lake ecosystem due to the integral ecological role of aquatic vegetation in the lake and the ability of vegetation to impact water quality (Dennison et al, 1993). This study will provide further information useful for effective management of Parker Lake, including fish habitat improvement, protection of sensitive areas, aquatic plant management, and water resource regulation. The PI data will provide baseline data information that can be used for comparison to future information and offer insight into changes in the lake.

Ecological Role: Lake plant life is the beginning of the lake's food chain, the foundation for all other lake life. Aquatic plants and algae provide food and oxygen for fish and wildlife, as well as cover and food for the invertebrates that many aquatic organisms depend on. Plants provide habitat and protective cover for aquatic animals. They also improve water quality, protect shorelines and lake bottoms, add to the aesthetic quality of the lake, and impact recreation.

Characterization of Water Quality: Aquatic plants can serve as indicators of water quality because of their sensitivity to water quality parameters such as clarity and nutrient levels (Dennison et al, 1993).

Background and History: Parker Lake is located in the Town of Jackson, Adams County, Wisconsin. The natural seepage lake is 60 surface acres in size. Maximum depth is 30'+, with an average depth of 13'. About 21% of the lake is over 20' deep. The shoreline is 1.16 miles, with some disturbance at most of it. `There is a public wayside (1300' of shore) located on the north side of the lake with a concrete path leading to the water. Although there is no public boat launch, the Parker Lake Lodge permits boats to be launched for a fee of $4.

Parker Lake is easily accessible off of State Highway 82. Residential development in both the surface and groundwatersheds is concentrated along the lakeshore. The surface watershed is about ½ agriculture and ½ woodland use. There are both terrestrial and aquatic Natural Heritage Communities directly south of the lake. Waterfowl, especially ducks, use this lake during spring and fall.

Fish inventories back to 1968 show that largemouth bass and panfish are abundant to common, depending on the species. Stocking from 1967 to 1992 included brown, rainbow & brook trout, bluegills, and walleyes. No rainbow trout or walleye were stocked after 1981, when it was determined that they weren't maintaining a population in the lake. Northern pike are found, but scarce. There was a carp eradication by chemicals in 1965.

A DNR Report from the 1960s found Parker Lake to be a “clear, hard water seepage lake with moderate transparency.” The Parker Lake Association commissioned a private assessment in 1998 that reported the lake to be “relatively clear…with nutrient levels typically indicating mesotrophic conditions.”

Both Eurasian Watermilfoil and Curly-Leaf Pondweed were reported in the lake prior to 2003.

II. METHODS

Field Methods

The 2005 and one 2010 aquatic plant survey study based on the rake-sampling method developed by Jessen and Lound (1962), using stratified random transects. The shoreline was divided into 12 equal sections, with a transect placed randomly within each segment, perpendicular to the shoreline.

One sampling site was randomly chosen in each depth zone (0-1.5’; 1.5’-5’; 5’-10’; 10’-20’) along each transect. Using long-handled, steel thatching rakes, four rake samples were taken at each site. Samples were taken from each quarter around the boat. Aquatic species present on each rake were recorded and given a density rating of 0-5.

A rating of 1 indicates the species was present on 1 rake sample.

A rating of 2 indicates the species was present on 2 rake samples.

A rating of 3 indicates the species was present on 3 rake samples.

A rating of 4 indicates the species was present on 4 rake samples.

A rating of 5 indicates that the species was abundantly present on all rake samples.

A visual inspection and periodic samples were taken between transects to record the presence of any species that didn't occur at the raking sites. Gleason and Cronquist (1991) nomenclature was used in recording plants found.

Shoreline type was also recorded at each transect. Visual inspection was made of 50' to the right and left of the boat along the shoreline, 35' back from the shore (so total view was 100' x 35'). Percent of land use within this rectangle was visually estimated and recorded.

The second method used was the Point Intercept Method. This method involves calculating the surface area of a lake and dividing it (using a formula developed by the WDNR) into a grid of several points, always placed at the same interval from the next one(s). These points are related to a particular latitude and longitude reading. At each geographic point, the depth is noted and one rake is taken, with a score given between 1 and 3 to each species on the rake.

A rating of 1 = a small amount present on the rake;
A rating of 2 = moderate amount present on the rake;
A rating of 3 = large amount present on the rake.

A visual inspection was done between points to record the presence of any species that didn't occur at the raking sites. Gleason and Cronquist (1991) nomenclature was used in recording plants found.

Data Analysis:

The percent frequency (number of sampling sites at which it occurred/total number of sampling sites) of each species was calculated. Relative frequency (number of species occurrences/total all species occurrences) was also determined. The mean density (sum of species' density rating/number of sampling sites) was calculated for each species. Relative density (sum of species' density/total plant density) was also determined. Mean density where present (sum of species' density rating/number of sampling sites at which species occurred) was calculated. Relative frequency and relative density results were summed to obtain a dominance value. Species diversity was measured by Simpson's Diversity Index.

The Average Coefficient of Conservation and Floristic Quality Index were calculated as outlined by Nichols (1998) to measure plant community disturbance. A coefficient of conservation is an assigned value between 0 and 10 that measures the probability that the species will occur in an undisturbed habitat. The Average Coefficient of Conservationism is the mean of the coefficients for the species found in the lake. The coefficient of conservatism is used to calculate the Floristic Quality Index, a measure of a plant community's closeness to an undisturbed condition.

An Aquatic Macrophyte Index was determined using the method developed by Nichols et al (2000). This measurement looks at the following seven parameters and assigns each of them a number on a scale of 1-10: maximum depth of plant growth; percentage of littoral zone vegetated; Simpson's diversity index; relative frequency of submersed species; relative frequency of sensitive species; taxa number; and relative frequency of exotic species. The average total for the North Central Hardwoods lakes and impoundments is between 48 and 57. The maximum score for this scale is 70.

III. RESULTS

Physical Data

The aquatic plant community can be impacted by several physical parameters. Water quality, including nutrients, algae and clarity, influence the plant community; the plant community in turn can modify these boundaries. Lake morphology, sediment composition and shoreline use also affect the plant community.

The trophic state of a lake is a classification of water quality (see Figure 1). Phosphorus concentration, chlorophyll a concentration and water clarity data are collected and combined to determine a trophic state. Eutrophic lakes are very productive, with high nutrient levels and large biomass presence. Oligotrophic lakes are those low in nutrients with limited plant growth and small fisheries. Mesotrophic lakes are those in between, i.e., those which have increased production over oligotrophic lakes, but less than eutrophic lakes; those with more biomass than oligotrophic lakes, but less than eutrophic lakes; those with a good and more varied fishery than either the eutrophic or oligotrophic lakes.

The limiting factor in most Wisconsin lakes, including Parker Lake, is phosphorus. Measuring the phosphorus in a lake system thus provides an indication of the nutrient level in a lake. Increased phosphorus in a lake will feed algal blooms and also may cause excess plant growth. The 2004-210 summer average phosphorus concentration in Parker Lake was 14.2 ug/l. This concentration suggests that Parker Lake may have some localized nuisance algal blooms, but its average total phosphorus is below the recommended 20 micrograms/liter to avoid full-lake algal blooms. This places Parker Lake in the “very good” water quality section for natural lakes and in the mesotrophic level for phosphorus.

Chlorophyll concentrations provide a measurement of the amount of algae in a lake's water. Algae are natural and essential in lakes, but high algal populations can increase water turbidity and reduce light available for plant growth. The 2004-2010 summer average chlorophyll concentration in Parker Lake was 2.9 ug/l. This is very low, placing Parker Lake at the oligotrophic level for chlorophyll a results.

Water clarity is a critical factor for plants. If plants don't get more than 2% of the surface illumination, they won't survive. Water clarity can be reduced by turbidity (suspended materials such as algae and silt) and dissolved organic chemicals that color or cloud the water. Water clarity is measured with a Secchi disk. Average summer Secchi disk clarity in Parker Lake in 2004-2010 was 12.1 feet. This is good to very good water clarity, putting Parker Lake into the oligotrophic category for water clarity.

It is normal for all of these values to fluctuate during a growing season. They can be affected by human use of the lake, by summer temperature variations, by algae growth & turbidity, and by rain or wind events. Phosphorus tends to rise in early summer, than decline as late summer and fall progress. Chlorophyll a tends to rise in level as the water warms, then decline as autumn cools the water. Water clarity also tends to decrease as summer progresses, probably due to algae growth, then decline as fall approaches.

Figure 1: Trophic State Parameters

Trophic State	Quality Index	Phosphorus	Chlorophyll a	Sechhi Disk
		(ug/l)	**(ug/l)**	**(ft)**
Oligotrophic	Excellent	<1	<1	>19
	Very Good	1 to 10	**1 to 5**	**8 to 19**
Mesotrophic	Good	**10 to 30**	5 to 10	6 to 8
	Fair	30 to 50	10 to 15	5 to 6
Eutrophic	Poor	50 to 150	15 to 30	3 to 4
Parker Lake		**14.2**	**2.9**	**12.1**

According to these results, Parker Lake scores as "mesotrophic" in its phosphorus levels and "oligotrophic" in water clarity and chlorophyll a readings. This state would favor moderate plant growth, occasional algal blooms and very good water clarity.

Lake morphology is an important factor in distribution of lake plants. Duarte & Kalff (1986) determined that the slope of a littoral zone could explain 72% of the observed variability in the growth of submerged plants. Gentle slopes support higher plant growth than steep slopes (Engel 1985).

Parker Lake is a fairly round basin that gradually slopes into a small deep section just past the center towards the east side of the lake. There are small areas of steeper slopes within the lake where the drop off is quicker on the south shore. With the high water clarity, plant growth may be favored in more of Parker Lake than one might expect since the sun can get to a fair amount of the sediment to stimulate plant growth.

Sediment composition can also affect plant growth, especially those rooted. The richness or sterility and texture of the sediment will determine the type and abundance of macrophyte species that can survive in a particular lake (see Figure 2).

Figure 2: Sediment Composition—Parker Lake

Sediment	**Type**	**0-1.5'**	**1.5'-5'**	**5'-10'**	**10'-20'**	**All Sites**
Hard	Sand	8.33%	8.33%	16.67%	50.00%	39.58%
Mixed	Sand/Marl		8.33%	25.00%		8.33%
	Sand/Silt		16.67%	16.67%	8.33%	10.42%
Soft	Marl		33.33%	16.67%	41.67%	22.92%
	Marl/Muck		16.67%			4.17%
	Marl/Peat		16.67%	16.67%		8.33%
	Muck	16.67%				4.17%
	Silt		8.33%			2.08%

The sediment in Parker Lake is quite varied. Although sand sediment may limit growth, all sandy sites in Parker Lake were vegetated. In fact, all sample sites were vegetated in Parker Lake, no matter what the sediment, in the 2005 and 2010 transect surveys. 79.5% of the 2010 PI sites were vegetated.

Shoreline land use often strongly impacts the aquatic plant community and thus the entire aquatic community. Impacts can be caused by increased erosion and sedimentation and higher run-off of nutrients, fertilizers and toxins applied to the land. Such impacts occur in both rural and residential settings.

During the transect surveys in 2005 and 2010, shore cover was estimated visually. Native herbaceous vegetation was the shoreline cover of the highest mean coverage in 2005 and 2010 and the highest frequency of occurrence. But disturbed sites, such as those with traditional lawn, rock/riprap, hard structures and pavement, were also common, covering nearly half the shoreline (47.7% in 2005 and 34.7% in 2010).

Bare unprotected sand was found at many sites as well (12.5% in 2005 and 13.7% in 2010).

Figure 3: Shoreland Land Use—Parker Lake

	2005	2010	
	Cover	Cover	Diff
Wooded	14.4%	13.1%	1.3
Herbaceous	23.2%	35.2%	12.0
Shrub	3.8%	3.0%	-1.8
Bare sand	12.5%	13.7%	1.2
Eroded		0.3%	0.3
Cultivated Lawn	21.8%	8.5%	-13.3
Hard Structure	18.4%	18.9%	0.5
Pavement/Riprap	5.9%	7.3%	1.4

Some type of vegetated shoreline was found at 100% of the sites, but only covered 41.4% of the shoreline in 2005. In the 2010 transect survey, some kind of vegetation was found at 93.3% of the sites, covering 51.3% of the shore. Although the amount of cover by cultivated lawn, the amount of hard structure, pavement and rock riprap went up by 1.9%. Further, some eroded sand was found in 2010 for the first time.

Macrophyte Data

SPECIES PRESENT

In the 2005 transect survey, 21 aquatic species were found in Parker Lake: 18 were native and 3 were exotic imports. In the native plant category, eight were emergent, one was a floating-leaf rooted plant, and eight were submergent. One macrophytic (plant-like) algae, *Chara* spp. (muskgrass) was found at nearly all the sample sites. No endangered or threatened species were found. Three exotic invasives, *Myriophyllum spicatum* (Eurasian Water Milfoil), *Phalaris arundinacea* (reed canary grass), and *Potamogeton crispus* (Curly-Leaf Pondweed) were found.

In the 2010 transect survey, 30 aquatic species were found. Of these, 29 were native species: 14 emergents; 2 floating-leaf rooted plants; 2 free-floating species; 10 were submergents; and 1 was a plant-like algae (*Chara)*. In addition, one invasive emergent plant was found in 2010: *Phalaris arundinacea* (which was found in 2005). Two invasives that were found in 2005 were not found in 2010: *Myriophyllum spicatum* and *Potamogeton crispus.* Since the 2005 survey, Parker Lake received a permit to chemically treat *M. spicatum*. Considering that in 2005, it was the second most-dominant aquatic species in the lake, but none was found in 2010, it suggests that the chemical treatment so far has been fairly successful. The 2005 transect survey was conducted in August, but *Potamogeton crispus*, which usually dies off by mid-July, was still found. The 2010 transect survey was conducted on July 1, 2010. If *Potamogeton crispus* was present in 2010, it should have been found during that survey.

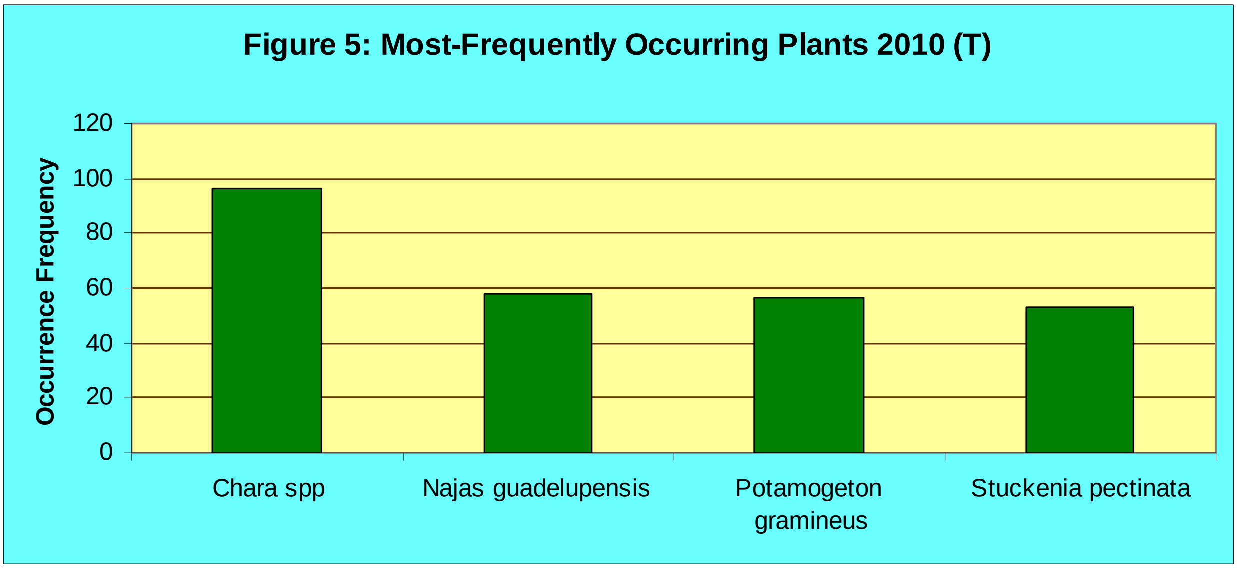
The 2010 Point Intercept survey was conducted during July 2010. 28 aquatic species were found. Of these, 27 were native species. One freshwater sponge was found and the macrophytic algae, *Chara,* were also found. The remaining native species were divided into 10 emergents, 2 floating-leaf rooted plants, 2 free-floating aquatic plants, and 11 were submergents. The invasive *Phalaris arundinacea* was also present in the 2010 PI survey.

Figure 4—Plant Found in Parker Lake, 2005-2010

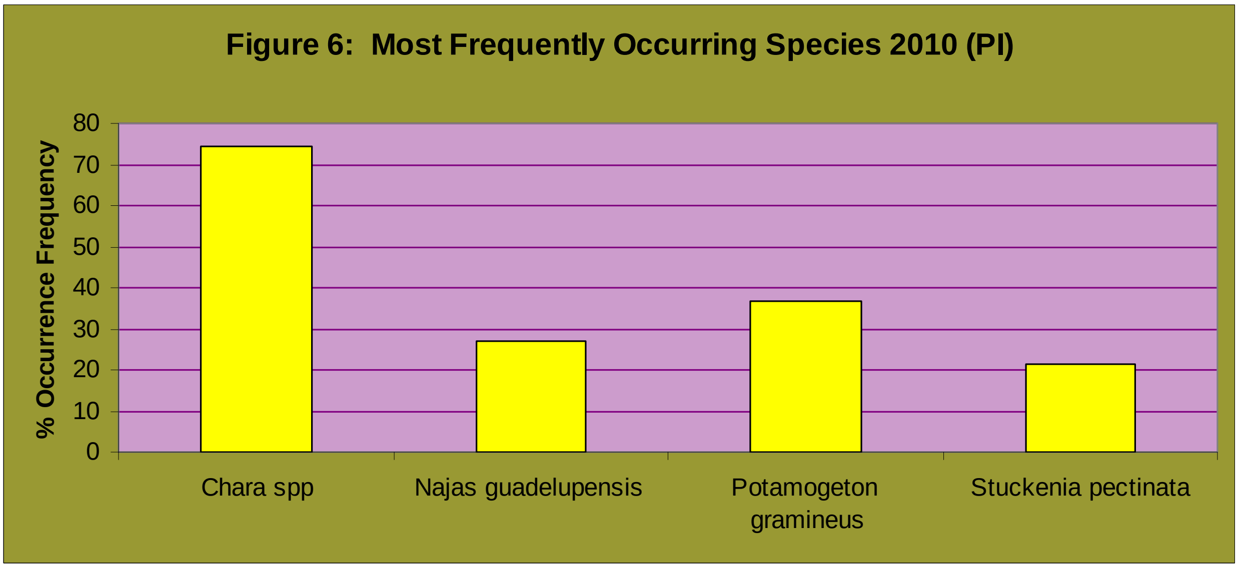
Scientific Name	Common Name	Type	2005 (T)	2010 (T)	2010 (PI)
Freshwater Sponge	Freshwater Sponge				x
Asclepias incarnata	Swamp Milkweed	E			x
Barbarea vulgaris	Yellow Rocket	E		x	
Calamagrostis canadensis	Blue-Joint Grass	E		x	
Carex spp	Sedge	E	x	x	x
Ceratophyllum demersum	Coontail	S	x	x	x
Chara sp	Muskgrass	S	x	x	x
Eleocharis acicularis	Needle Spike Rush	E		x	
Eleocharis palustris	Common Spike Rush	E	x	x	
Eleodea canadensis	Common Waterweed	S			x
Eupatorium perfiolatum	Boneset	E		x	x
Impatiens capensis	Jewelweed	E		x	x
Iris versicolor	Blue-Flag Iris	E	x	x	x
Leersia oryzoides	Rice Cutgrass	E		x	
Lemna minor	Lesser Duckweed	FF		x	x
Myriophyllum sibiricum	Northern Milfoil	S		x	x
Myriophyllum spicatum	Eurasian Watermilfoil	S	x		
Najas flexilis	Bushy Pondweed	S		x	x
Najas guadelupensis	Southern Naiad	S	x	x	x
Nymphaea odorata	White Water Lily	FL	x	x	x
Phalaris arundinacea	Reed Canarygrass	E	x	x	x
Polygonum amphibium	Water Smartweed	FL	x	x	x
Polygonum lapathifolium	Heart's Ease	E		x	x
Polygonum persicaria	Spotted Lady's Thumb	E			x
Potamogeton crispus	Curly-Leaf Pondweed	S	x		
Potamogeton gramineus	Variable-Leaf Pondweed	S	x	x	x
Potamogeton illinoensis	Illinois Pondweed	S	x		x
Potamogeton pusillus	Small Pondweed	S			x
Potamogeton zosteriformis	Flat-Stemmed Pondweed	S	x	x	x
Rumex verticillatus	Water Dock	E	x	x	
Salix spp	Willow	E	x		
Schoenoplectus pungens	Chairmaker's Rush	E		x	x
Schoenoplectus tabernaemontani	Soft-Stemmed Bulrush	E	x	x	x
Sparganium eurycarpum	Common Bur-reed	E	x		
Spirodela polyrhiza	Greater Duckweed	FF		x	x
Stuckenia pectinata	Sago Pondweed	S	x	x	x
Typha latifolia	Broad-Leaved Cattail	E	x	x	x
Utricularia intermedia	Northern Bladderwort	S		x	
Utricularia vulgaris	Greater Bladderwort	S		x	
Vallisneria americana	Water Celery	S	x	x	x

FREQUENCY OF OCCURRENCE

Chara spp. was the most frequently-occurring "plant" in Parker Lake in 2005. Three other species reached an occurrence frequency of 50% or greater: *Myriophyllum spicatum* (Eurasian watermilfoil), *Potamogeton illinoenisis* (Illinois pondweed), and *Stuckenia pectinata* (Sago pondweed). In the 2010 transect survey, the aquatic species with the highest frequency of occurrence was the macrophytic algae, *Chara* spp (muskgrass). Again, three species reached occurrence frequencies of over 50%, but they weren't the same aquatic species. While *Stuckenia pectinata* still was in the over 50% occurrence frequency, *Najas guadelupensis* and *Potamogeton gramineus* replaced *Myriophyllum spicatum* and *Potamogeton illinoensis.*



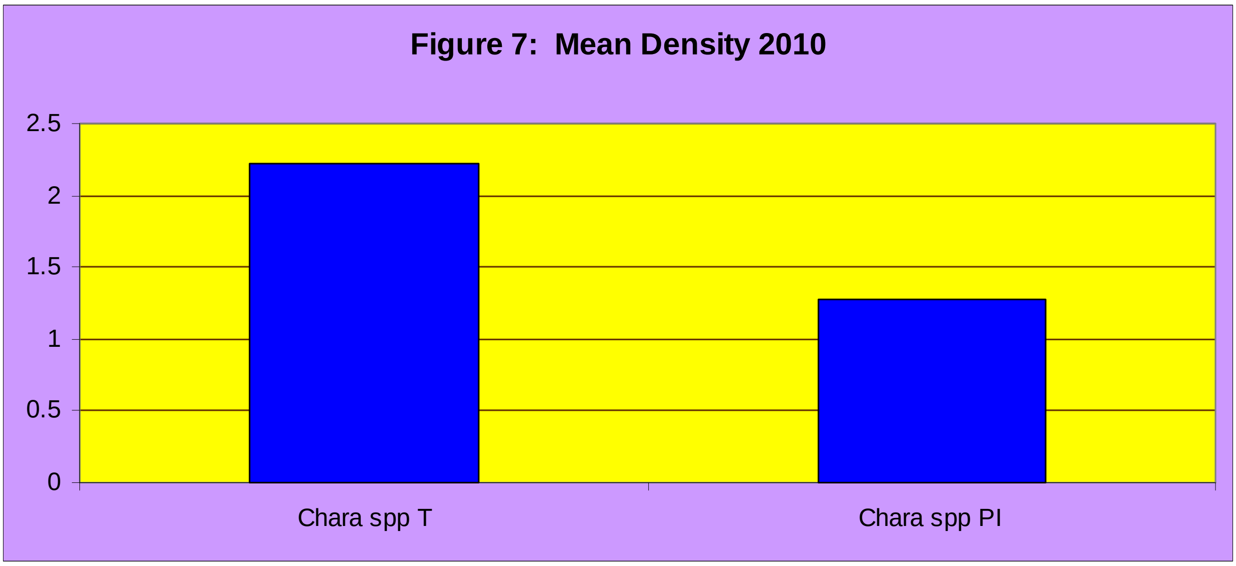
In the 2010 PI survey, only *Chara* spp had an occurrence frequency over 50%. *Chara* spp was found at nearly 2/3 of the PI sites in 2010. The next most frequently-occurring plant in 2010 was *Potamogeton gramineus*, which had about ½ the occurrence frequency of *Chara* spp.



DENSITY OF OCCURRENCE

Ceratophyllum demersum (coontail) was the species with the highest mean density in Parker Lake in the 2005 transect survey. In both 2010 surveys, *Chara* spp had the highest mean density. In the 2010 transect survey, *Chara* spp had a more than average density of growth, but in the 2010 PI survey, it did not.   In both instances, the next closest aquatic species was far below *Chara* spp in mean density or in mean density where present.

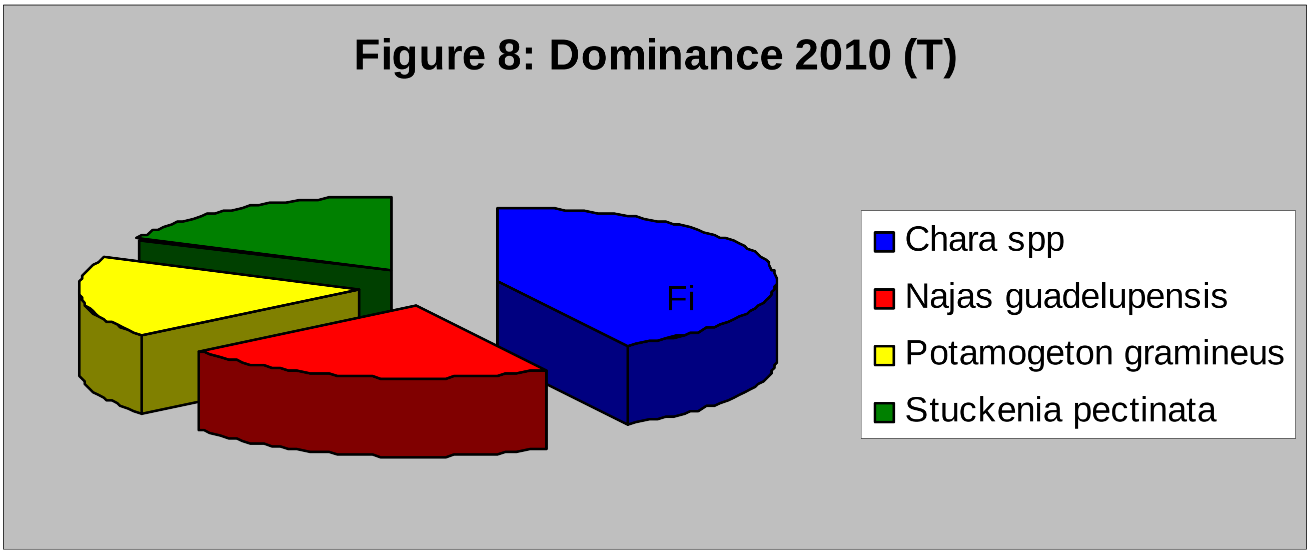
In Parker Lake in 2010 (T), only *Chara* spp had a more than 50 % density of growth in both the lake overall and where present. In the PI survey in 2010, no species had a such a high density of growth overall or where present. This is a change from 2005, when 6 aquatic species had a more than 50% density of growth where present.



DOMINANCE

Relative frequency and relative density are combined into a dominance value that demonstrates how dominant a species is within its aquatic plant community. Based on dominance value, *Chara* spp was the dominant aquatic plant species in Parker Lake Lake in 2005 in all depth zones. Sub-dominant were *Myriophyllum spicatum*, *Najas guadelupensis*, and *Potamogeton illinoensis.*

In the 2010 transect survey, *Chara* was the dominant aquatic species. There were no species that were subdominant. The same was true in the 2010 PI survey, i.e., *Chara* spp. was dominant and no other species was close enough to that to be called sub-dominant.



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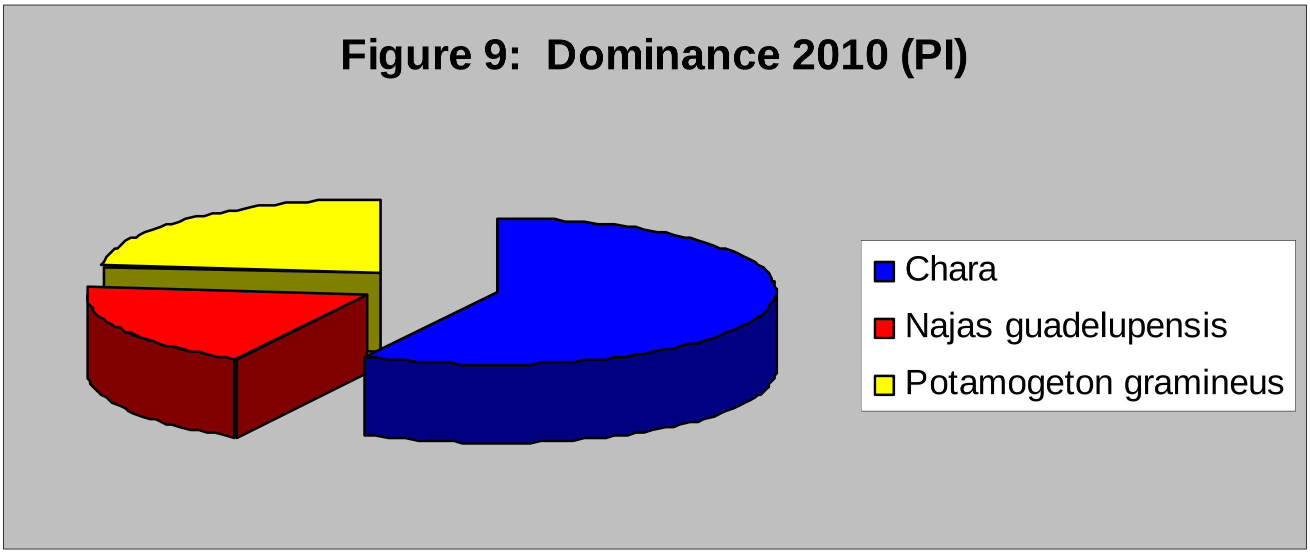


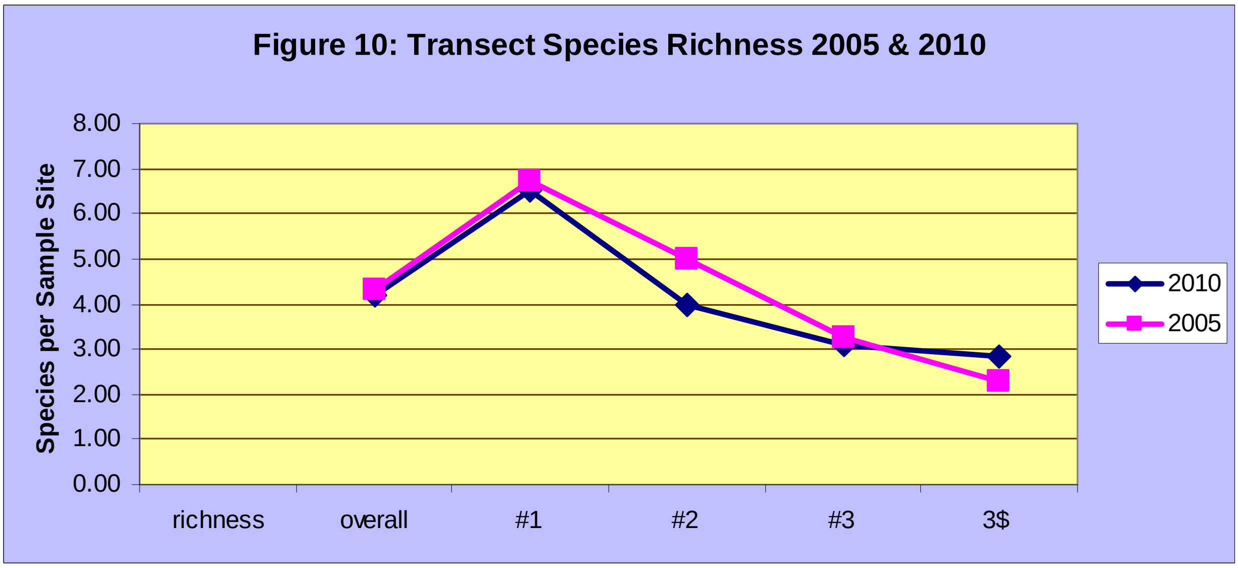
VI. DISCUSSION

Aquatic plants occurred at 100% of the sample sites in Parker Lake during the 2010 transect survey to a maximum rooting depth of 16 feet. The 2005 transect survey also found rooted aquatic plants at all sample sites. Rooted-floating-leaf plants were found in only in the two shallowest zones in both 2005 and 2010.

Secchi disc readings are used to predict maximum rooting depth for plants in a lake (Dunst, 1982). Based on the summer 2004-2010 Secchi disc readings, the predicted maximum rooting depth in Parker Lake would 20 feet. During the 2010 aquatic plant survey, rooted plants were found at a depth of 16 feet, i.e., rooted plants were not found in the maximum depth than would usually be expected by Dunst calculations.

The 0-1.5 feet depth zone produced the most frequently occurring and densest plant growth. Both frequency and density then dropped off as samples sites were at a greater depth, although plants were still found in those depths. By the 10 to 20 foot depth zone, frequency of occurrence and density of growth were about 1/3 of what they were in the shallowest zone.

Overall species richness (number of species per sample site) for the 2010 transect survey was 4.2 per site. Zone 1 (0-1.5 ft) had a species richness of 6.5. Species richness declined as depth increased: Zone 2 (1.5-5 ft) had a species richness value of 4, which declined to 3.1 for Zone 3 (5-10 ft), then down to 2.8 for Zone 4 (10-20 ft). Figure 10 shows the differences between 2005 and 2010 species richness.



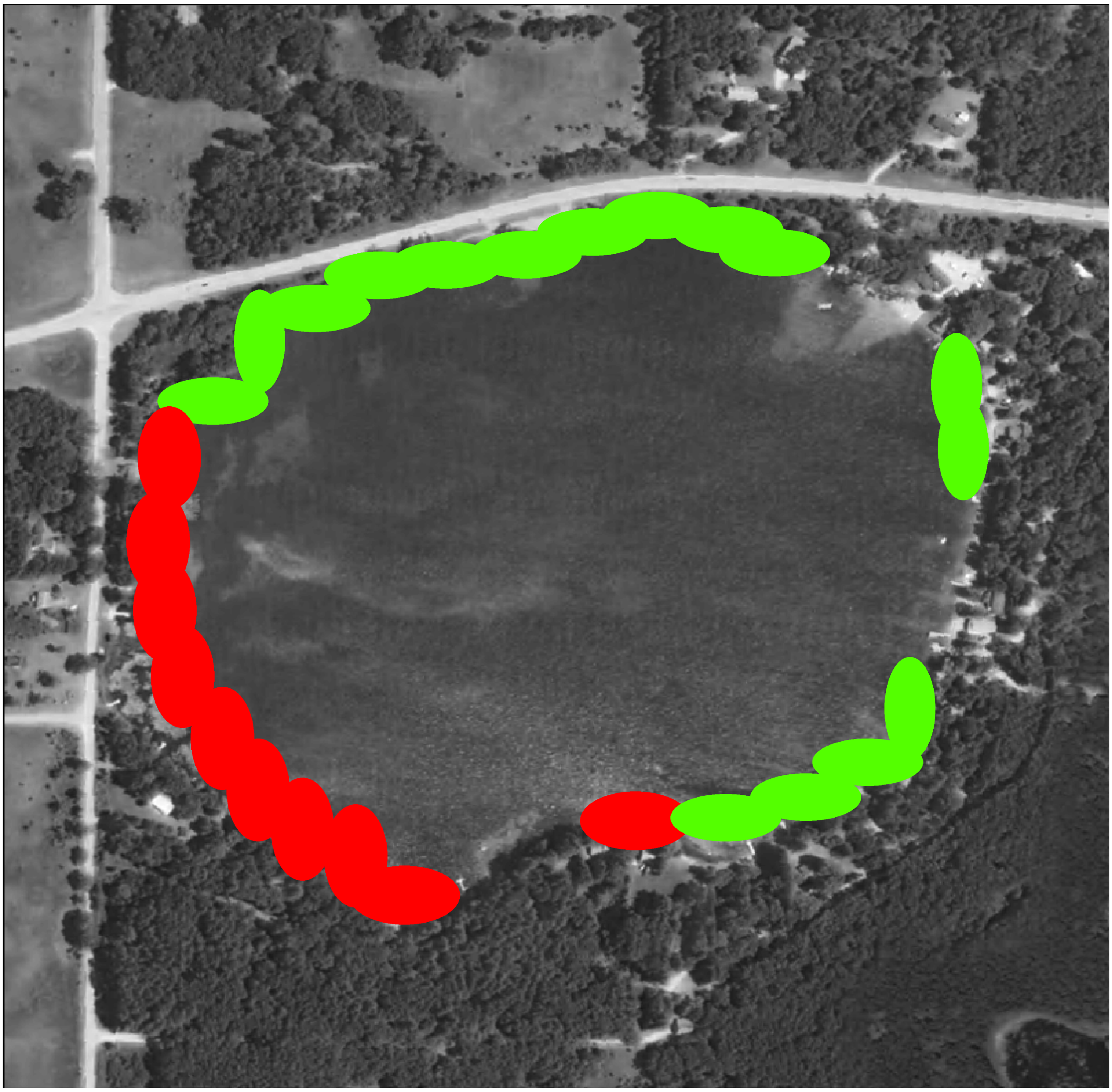
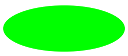


Figure 11a: Distribution of Emergent Plants in Parker Lake 2010 (T)



Native Emergent Plants Found

Native Emergent Plants Found Plus Invasive Reed Canary Grass

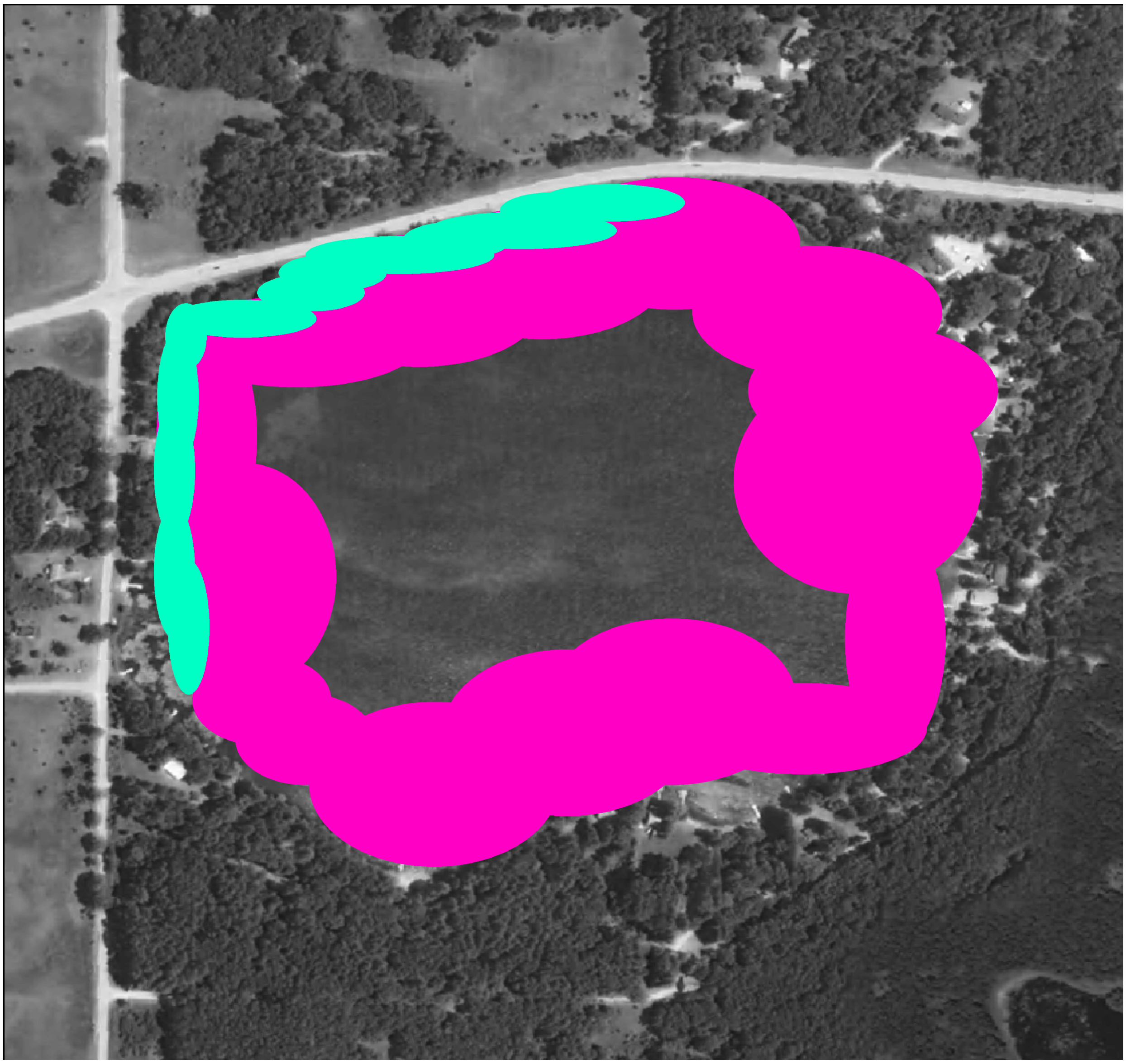
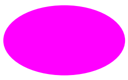
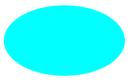


Figure 11b: Distribution of Rooted Floating-Leaf and Submergents in Parker Lake 2010 (T)



Native Submergent Plants Found



Native Submergents and Native Rooted Floating-Leaf Plants Found

Only about 80% of the sample sites in the PI survey were vegetated. The non-vegetated sites included mostly depths over 20 feet. Only 4 sites with less than 20 feet of depth were not vegetated, and 3 of those were over 18 feet in depth. The remaining non-vegetated site, which was under 5 feet in depth, looked as if it had been cleared out by the adjacent landowner, as was his or her right under Wisconsin law.

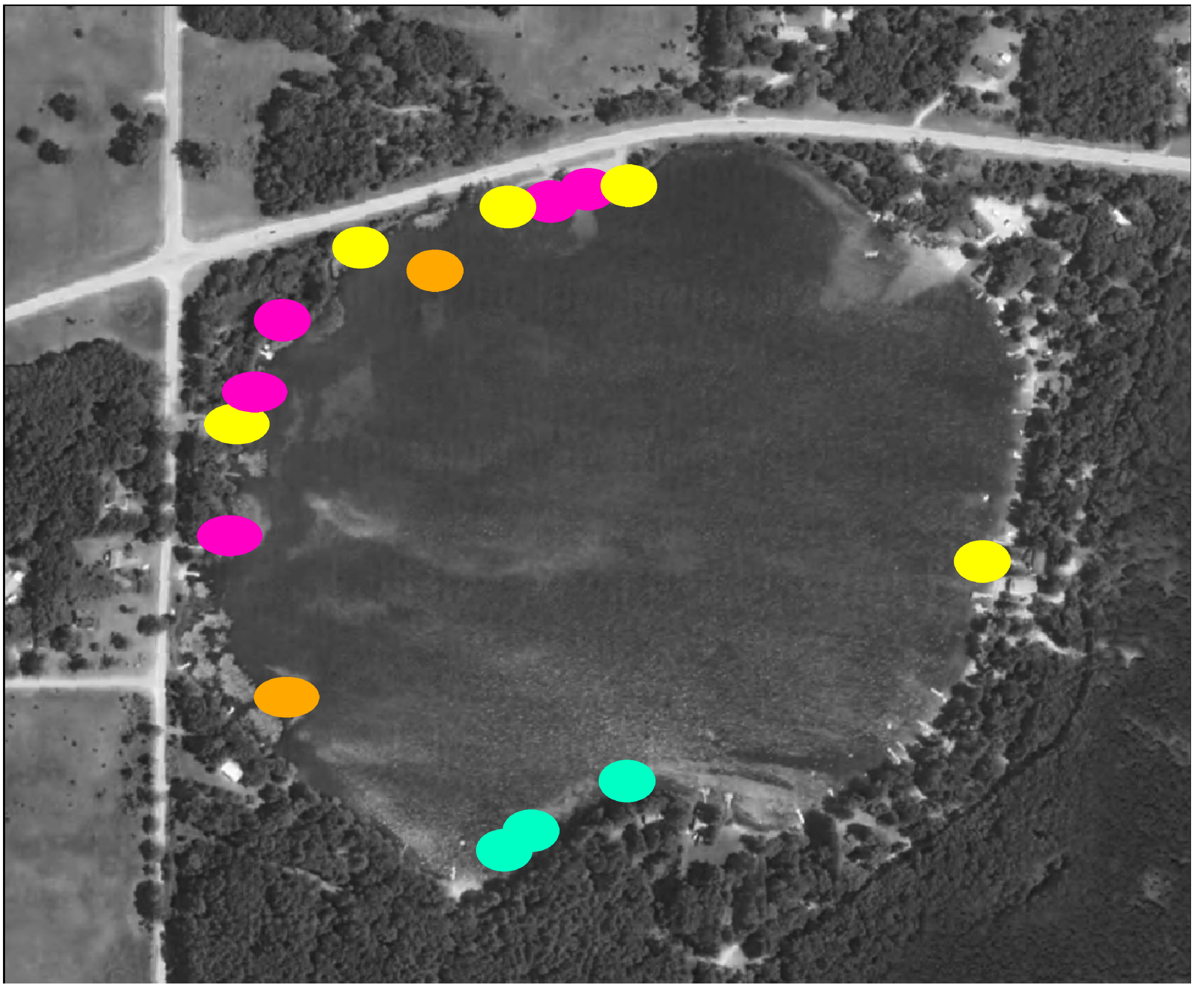


Figure 12a: Distribution of Emergent and Rooted Floating-Leaf Plants 2010 (PI)

	Native Emergents only		**Native Emergents & Reed Canarygrass**
	Native Rooted Floating-Leaf plants only		**Native Emergents & Rooted Floating-Leaf plants**

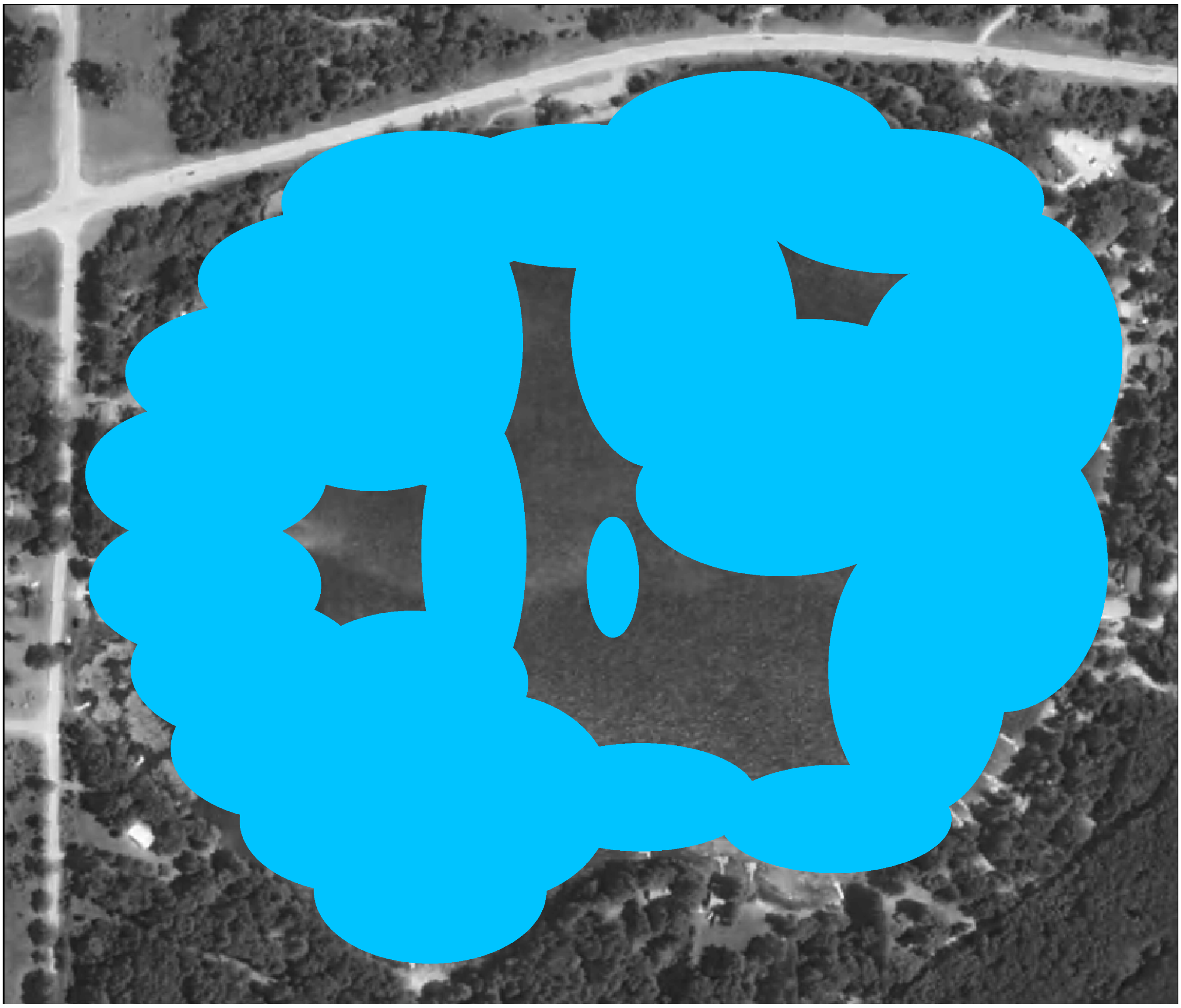


Figure 12b: Distribution of Native Submergent Plants 2010 (PI)

Overall species richness for the 2010 PI survey was 2.1 species per site. When considering only vegetated sites (about 80% of the total sites), the figure rose to 2.6 species per site.

THE COMMUNITY

The 2010 transect Simpson's Diversity Index score for Parker Lake was .87, suggesting fair species diversity. This is about the same SI score as the 2005 transect aquatic plant survey. A rating of 1.0 would mean that each plant in the lake was a different species (the most diversity achievable). However, the 2010 PI survey scored only .79, which is a very poor level of diversity. The difference can probably be accounted for by the few shallow sampling points in the PI survey and the geographic structure of Parker Lake itself. The PI points were gridded 30 meters apart (just over 98 feet). In a kettle lake like Parker, depth can go from 1.1 feet to 26 feet in that distance, leaving any plants between the 1.1 foot depth and 26 feet uncounted. In the transect survey, where sample sites are determined by depth zone, rather than a geographic grid, depths between 1.1 and 20 feet are sampled.

The Aquatic Macrophyte Community Index (AMCI) for the 2010 transect survey of Parker Lake is 62, up 5 points from the 2005 figure of 57. This 2010 figure is above the average range for North Central Wisconsin Hardwood Lakes and all Wisconsin lakes, while the 2005 was within the average range.

Figure 13: Aquatic Macrophyte Community Index 2005 v 2010 (T)

		2005		2010
Parameter	**Data**	**Score**	**Data**	**Score**
Depth of Rooting	13.5 ft	8	16 ft	9
Littoral % Veg	100	10	100	10
Sub Veg %	80	10	75	10
SI	0.87	8	0.87	8
Taxa #	21	9	29	10
Sensitive Veg %	25	9	29	9
Exot Veg %	21	3	3	6
Overall Score		57		62

The AMCI for the 2010 PI aquatic plant survey was 69. This, too, is above the average range for North Central Hardwood Forests and for all Wisconsin lakes.

Figure 14: AMCI for 2010 PI Survey on Parker Lake

Parameter	Value	Score
Depth of Rooting	18.1 ft	10
Littoral % Veg	79.5	10
Sub Veg %	87	9
SI	0.79	4
Taxa #	27	10
Sensitive Veg %	43	10
Exot Veg %	1	6
Overall Score		59

In 2005, there was a substantial presence of several exotic invasives in the aquatic plant community in Parker Lake. Further, a visual survey in late May 2006 indicated Curly-Leaf Pondweed was found in much of the lake, although not in amounts of high frequency or density. Reed Canarygrass was only found in the shallowest depth zone. However, both when the August 2005 survey was done and during the 2006 visual survey, large dense patches of Eurasian Watermilfoil were evident all over the lake. Its tenacity and ability to spread to large areas fairly quickly make it a danger to the diversity of Parker Lake's current aquatic plant community. Curly-Leaf Pondweed will also need to be watched.

Since that time, as mentioned earlier, Parker Lake gained permission from the WDNR to chemically treat the Eurasian watermilfoil, which was 15% of the aquatic plant community in 2005. It appears from the 2010 surveys that the treatment regime has at least been temporarily successful, since no Eurasian watermilfoil was found in either the transect or PI survey in 2010. However, that doesn't mean that the Parker

Lake Association should assume that Eurasian watermilfoil is “licked” at its lake. Careful watch will need to continue.

Chara spp and *Najas guadelupensis* were found frequently in both 2005 and 2010 transect surveys, but the most obvious change between the 2005 and 2010 transect surveys was in the significant increase in the presence of *Potamogeton gramineus* (Variable-Leaf Pondweed). In 2006, it only had an occurrence frequency of 4.1%, but by 2010, it had an occurrence frequency of 52.1%. It went from a dominance value of .01 in 2005 to .23 in 2010. This means it went from 5% of the total plant community in 2005 to 11.5% of the 2010 plant community (transect).

A Coefficient of Conservatism and a Floristic Index calculation were performed on the field results. Technically, the average Coefficient of Conservatism measures the community’s sensitivity to disturbance, while the Floristic Index measures the community’s closeness to an undisturbed condition. Indirectly, they measure past and/or current disturbance to the particular community.

Previously, a value was assigned to all plants known in Wisconsin to categorize their probability of occurring in an undisturbed habitat. This value is called the plant’s Coefficient of Conservatism. A score of 0 indicates a native or alien opportunistic invasive plant. Plants with a value of 1 to 3 are widespread native plants. Values of 4 to 6 describe native plants found most commonly in early successional ecosystem. Plants scoring 6 to 8 are native plants found in stable climax conditions. Finally, plants with a value of 9 or 10 are native plants found in areas of high quality and are often endangered or threatened. In other words, the lower the numerical value a plant has, the more likely it is to be found in disturbed areas.

The 2010 Average Coefficient of Conservatism from the transect method was 4.76, up from the 2005 figure of 4.05. The 2010 figure for the PI survey was 4.54. All these figures put Parker Lake in the lowest quartile for Wisconsin Lakes (6.0) and for lakes in the North Central Hardwood Region (5.6). The aquatic plant community in Parker Lake is in the category of those most tolerant of disturbance, probably due to selection by a series of past disturbances.

The Floristic Quality Index is also a tool that can be used to identify areas of high conservation value, monitor sites over time, assess the anthropogenic (human-caused) impacts affecting an area and measure the ecological condition of an area (M. Bourdaghs, 2006). The Floristic Quality Index for the 2010 transect survey was 25.63, up from the 2005 figure of 18.55. The FQI for the 2010 PI survey was 23.14. Both of these figures are above the average for Wisconsin Lakes (22.2) and the North Central Hardwood Region (20.9). This indicates that the plant community in Parker Lake is farther from an undisturbed condition than the average lake in Wisconsin overall and in the North Central Hardwood Region. In other words, the aquatic plant community in Parker Lake has been impacted by at least an average amount of disturbance.

Figure 15: Floristic Quality and Coefficient of Conservatism of Parker Lake, Compared to Wisconsin Lakes and Northern Wisconsin Lakes.

	Average Coefficient of Conservatism †	Floristic Quality ‡
Wisconsin Lakes	5.5, 6.0, 6.9 *	16.9, 22.2, 27.5
NCHR	5.2, 5.6, 5.8 *	17.0, 20.9, 24.4
Parker Lake 2010	4.54, 4.76	23.14, 25.63

***** - Values indicate the highest value of the lowest quartile, the mean and the lowest value of the upper quartile.
† - Average Coefficient of Conservatism for all Wisconsin lakes ranged from a low of 2.0 (the most disturbance tolerant) to a high of 9.5 (least disturbance tolerant).
‡ - lowest Floristic Quality was 3.0 (farthest from an undisturbed condition) and the high was 44.6 (closest to an undisturbed condition).

"Disturbance" is a term that covers many disruptions to a natural community. It includes physical disturbances to plant beds such as boat traffic, plant harvesting, chemical treatments, dock and other structure placements, shoreline development and fluctuating water levels. Indirect disturbances like sedimentation, erosion, increased algal growth, and other water quality impacts will also negatively affect an aquatic plant community. Biological disturbances such as the introduction of non-native and/or invasive species (such as the Eurasian Watermilfoil, Curly-Leaf Pondweed and Reed Canarygrass found here in 2005), destruction of plant beds, or changes in aquatic wildlife can also negatively impact an aquatic plant community.

Since only two of the sample transects had an entirely native shore, i.e., almost 87% of the sites had some kind of human disturbance, calculating Average Coefficient of Conservationism, Floristic Quality Index, Simpson's Index of Diversity and Aquatic Macrophyte Community Index to compare disturbed to undisturbed shorelines doesn't seem appropriate in the case of Parker Lake.

Apparent major disturbances to Parker Lake include heavier recreational use, shoreline development, invasion of exotic species, deposition of sediment and fluctuating water levels. In the instance of Parker Lake, it could be that runoff from Highway 82 and from 3rd Avenue also cause disturbance in its plant community.

IV. COMPARISON TO PRIOR YEARS

Results of the 2005 and 2010 transect surveys were compared using a number of parameters. The number of sites with emergent aquatic plant went down slightly, as did the number of sites with rooted floating-leaf plants. Free-floating plants were found in 2010, but not found in 2005. While the Simpson's Index and the species richness overall are down slightly, the Average Coefficient of Conservatism, Floristic Quality Index and Aquatic Macrophyte Community Index are all up somewhat.

Figure 16: Comparison of Plant Communities 2005 vs 2010

	Changes in the Macrophyte Community			
Parker	2005	2010	Change	%Change
Number of Species	21	29	8	38.1%
Maximum Rooting Depth (feet)	11.5	16.0	5	39.1%
% of Littoral Zone Unvegetated	0	0	0	0.0%
%Sites/Emergents	22.9	16.4	-6.5	-28.4%
%Sites/Free-floating	0.0	3.6	3.6	100.0%
%Sites/Submergents	100.0	100.0	0.0	0.0%
%Sites/Floating-leaf	12.5	10.9	-1.6	-12.8%
Simpson's Diversity Index	0.88	0.87	-0.01	-1.1%
Species Richness	4.25	4.18	-0.07	-1.6%
Floristic Quality	18.55	25.63	7.08	38.2%
Average Coefficient of Conservatism	4.05	4.76	0.71	17.5%
AMCI Index	57	62	5.00	8.8%

A number of species, especially emergent species, have appeared since 2005. 11 emergent species were found in one or both of the 2010 aquatic plant surveys that weren't found in 2005. 5 species of submergent plants were found in 2010 that weren't found in 2005, as well as one free-floating plant. A few species were found in 2005 that weren't found in 2010, 2 of which were native emergents. The other two found in 2005, but not in 2010, were the invasives *Myriophyllum spicatum* and *Potamogeton crispus.* It is good news that these weren't found in 2010, especially the former, since it was so prevalent in 2005, but it is too early to count these invasives as no longer part of the Parker Lake aquatic plant community.

The results of the 2005 and 2010 transect surveys were also compared using Jaccard's coefficient of similarity. This procedure allows two communities to be compared for similarity and dissimilarity. A coefficient of .75 or more suggests that the communities are statistically similar. When these calculations were performed using actual frequency of occurrence and relative frequency of occurrence, the 2005 and 2010 transect aquatic plant communities scored as 74.6% similar on the basis of actual frequency of occurrence and 75.9% on the basis of relative frequency.

Since 2010 was the first time a point intercept survey had been done on Parker Lake, there was no basis to do a coefficient of similarity calculation. Since methods of surveying, rating scale and points sampled were different between the transect surveys and the PI survey, comparisons would not be appropriate.

V. CONCLUSION

Based on water clarity, chlorophyll and phosphorus data, Parker Lake is a mesotrophic seepage lake with good to very good water clarity and good water quality. This trophic state should support moderate plant growth and occasional algal blooms. At times, however, it appears that aquatic plant growth in Parker Lake is higher than the expected "moderate" for this trophic state, most likely due to the invasion of exotics. It is possible that road runoff may also add unwanted nutrients to the lake water that would encourage plant growth. It should be noted that the results for water testing for salinity between 2004 and 2006 showed that Parker Lake had a salinity value 1.7 to 2.3 times higher than most the lakes in Adams County, which may also be from runoff of road salt.

Sufficient nutrients (trophic state), high water clarity, and increased shore development at Parker Lake favor plant growth. Although sometimes sand sediment may limit aquatic plant growth, this does not seem to be the case in Parker Lake. 100% of the lake is vegetated in water less than 20 feet deep, suggesting that even the sand sediments in Parker Lake hold sufficient nutrients to maintain aquatic plant growth.

Aquatic vegetation occurred at 100% of the sample sites, with 94% of the sites having rooted aquatic plants. The maximum rooting depth, based on water clarity figures, is the less than the found rooted aquatic plant growth. The 0 to 1.5 foot depth zone had the highest frequency of occurrence and growth density in the 2010 transect survey. Nearly 80% of the PI points in 2010 were also vegetated.

The lake does have a good mixture of emergent, rooted floating-leaf and rooted plants. In 2010, a free-floating plant was also found in Parker Lake. In the 2010 transect survey, 30 aquatic species were found. Of these, 29 were native species: 14 emergents; 2 floating-leaf rooted plants; 2 free-floating species; 10 were submergents; and 1 was a plant-like algae (*Chara)*. In addition, one invasive emergent plant was found in 2010: *Phalaris arundinacea* (which was found in 2005). Two invasives that were found in 2005 were not found in 2010: *Myriophyllum spicatum* and *Potamogeton crispus.* Since the 2005 survey, Parker Lake received a permit to chemically treat *M. spicatum*. Considering that in 2005, it was the second most-dominant aquatic species in the lake, but none was found in 2010, it suggests that the chemical treatment so far has been fairly successful. The 2005 transect survey was conducted in August, but *Potamogeton crispus*, which usually dies off by mid-July, was still found. The 2010 transect survey was conducted on July 1, 2010. If *Potamogeton crispus* was present in 2010, it should have been found during that survey.

The 2010 Point Intercept survey was also conducted during July 2010. 28 aquatic species were found. Of these, 27 were native species. One freshwater sponge was found and the macrophytic algae, *Chara*, were also found. The remaining native species were divided into 10 emergents, 2 floating-leaf rooted plants, 2 free-floating aquatic plants, and 11 were submergents. The invasive *Phalaris arundinacea* was also present in the 2010 PI survey.

Many of the species found in Parker Lake have multiple uses for wildlife.

FIGURE 17: BENEFITS OF SOME AQUATIC PLANTS

	Fish	Water Fowl	Shore Birds	Upland Birds	Muskrat	Beaver	Deer
Ceratophyllum demersum	F,I,C,S	F,I,C			F		
Chara spp	F,S	F,I,C					
Lemna minor	F,I,C,S	F	F		F	F	
Myriophyllum heterophyllum	F,I,C,S	F,I	F		F		
Myriophyllum sibiricum	F,I,C,S	F,I	F		F		
Najas flexilis	F.C	F	F				
Stuckenia pectinata	F,I,C,S	F,I	F		F	F	F
Potamogeton zosteriformis	F,I,C,S	F,I	F		F	F	F
Schoenoplectus tabernaemontani	F,C,I	F,C	F,C,N	F	F	F	F
Typha latifolia	I,C,S	F	F,C,N		F,C,N	F	

F = Food; I = Shelters Invertebrates; C = Cover; S = Spawning; N = Nesting

The most developed shore—that along the east side of the lake—has many “grandfathered” buildings that are close to the shore, suggesting that runoff from impervious surfaces such as decks or rooftops could be adding to the pollutant load in the lake. Installation of as much buffer (native) vegetation as possible between the buildings and the ordinary high water mark could filter pollutants and nutrients and help keep them out of the lake water.

Along the southwest shore there is an area of wooded shore that should be preserved as it is to maintain habitat and to serve as a buffer for that area. Studies have suggested that runoff from establish wooded land is substantially less than that of developed areas.

In addition to the area on State Highway 82, 3rd Avenue runs along part of the west side of the lake, close to the lake. This is one area where there was a large mat of Eurasian Watermilfoil in the past. Steps need to be taken to reduce the pollution from road runoff into the lake at these sites. Near the wayside on Highway 82 is a snag tree that should be left for habitat and anchoring.

While the summer 2005 field survey showed that *Myriophyllum spicatum* (Eurasian Watermilfoil) was on its way to dominating the aquatic plant community of Parker Lake unless it was soon checked, subsequent management of this invasive by chemical spot treatments has reduced it to the point where it was not found in either 2010 survey. The plant management plan needs to include keeping watch for any recurrence of this invasive, so that quick action can be taken. A plant management plan may also need to address the curly-leaf pondweed issue if this exotic occurs again.

The Parker's Diversity Index for Parker Lake was .87 for the 2010 transect survey, suggesting good species diversity, and .79 for the 2010 PI survey, suggesting poor species diversity. The Aquatic Macrophyte Community Index (AMCI) for Parker Lake is 62 for the transect survey in 2010 and 59 for the PI survey. These figures are both above the averages for all Wisconsin lakes and the North Central Hardwood region. However, the Average Coefficients of Conservatism in 2010 put Parker Lake in the group of lakes most tolerant of disturbance in Wisconsin lakes and lakes in the North Central Hardwood Region. But the Floristic Quality Indices of the aquatic plant community in Parker Lake for the 2010 transect survey was above average for all Wisconsin Lakes and lakes in the North Central Hardwood Region. The FQI for the PI survey was in the average range for both areas. This suggests that the aquatic plant community in Parker Lake has been impacted by some disturbances, although the amount of that disturbance depends on the survey being examined.

Herbaceous shore cover was the most frequently-occurring shoreline cover in 2010 in Parker Lake, since it was found at 100% of the sample sites, but only covered 35.2% of the shore. Bare sand and cultivated lawn were tied for the next most frequently-occurring shore cover and had a coverage rate of 22.2%. Other disturbed sites, such as those with hard structure, rock/riprap and pavement, were had a shore coverage of over 26.5%. Some type of disturbed shoreline was found at nearly 87% of the sites and covered 35% of the shoreline.

Although this is down from the 2005 figure, it still verifies that 1/3 of Parker Lake's shoreline offers little protection for water quality and have significant potential to negatively impact Parker Lake's water by increased runoff (including lawn fertilizers, pet waste, pesticides) and shore erosion. Expanding the amount of vegetation at the shoreline, especially with wide buffers, and reducing the amount of disturbed areas would help prevent erosion and reduce runoff into the lake that contributes to algal growth, increased sedimentation, and reduced water quality. Installation of buffers and handling of building runoff is especially important because many of the cottages at Parker Lake were installed before the state shore setback rules, so are closer than 50 feet to the shore. In some instances, the cottages are literally on the shore.

V. RECOMMENDATIONS

Parker Lake is a oligotrophic to mesotrophic lake with good to very good water quality and high water clarity. The quality of the aquatic plant community in Parker Lake ranges from below average to above average for Wisconsin lakes and for lakes in the North Central Hardwood region, depending on the measurement used. Structurally, it does contain emergent plants, rooted plants with floating leaves, and submergents. However, the community is characterized by several plants that tolerate a significant amount of disturbance.

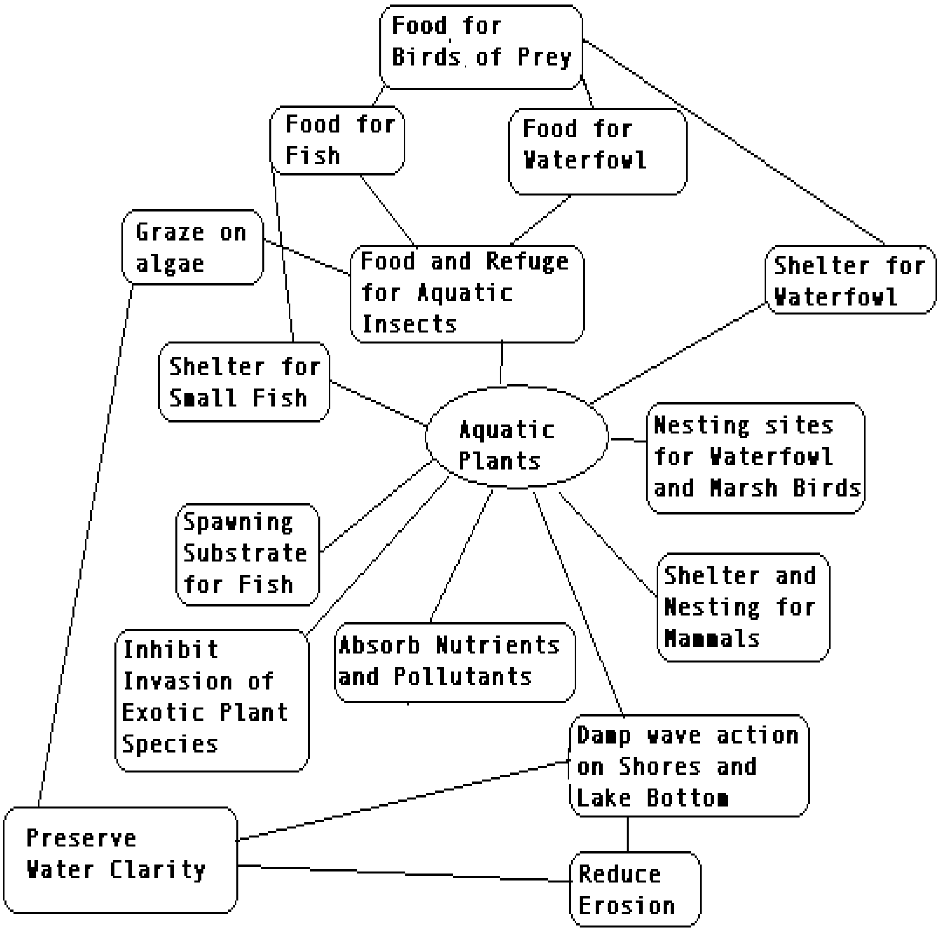
The most frequent and dominant plant in the lake was actually a macrophytic algae, *Chara* spp. No other aquatic species was frequent enough to be subdominant in either aquatic plant survey in 2010. 100% of the transect sites and nearly 80% of the PI sites had rooted aquatic plants. *Chara* spp was the only species to occur at a frequency of more than 50% and the other species that had a more than average density of growth.

A healthy and diverse aquatic plant community plays a vital role within the lake ecosystem. Plants help improve water quality by trapping nutrients, debris and pollutants in the water body; by absorbing and/or breaking down some pollutants; by reducing shore erosion by decreasing wave action and stabilizing shorelines and lake bottoms; and by tying-up nutrients that would otherwise be available for algae blooms. Aquatic plants provide valuable habitat resources for fish and wildlife, often being the base level for the multi-level food chain in the lake ecosystem, and also produce oxygen needed by animals.

Further, a healthy and diverse aquatic plant community can better resist the invasion of species (native and non-native) that might otherwise "take over" and create a lower quality aquatic plant community. A well-established and diverse plant community of natives can help check the growth of more tolerant (and less desirable) plants that would otherwise crowd out some of the more sensitive species, thus reducing diversity.

Vegetated lake bottoms support larger and more diverse invertebrate populations that in turn support larger and more diverse fish and wildlife populations (Engel, 1985). Also, a mixed stand of aquatic macrophytes (plants) supports 3 to 8 times more invertebrates and fish than do monocultural stands (Engel, 1990). A diverse plant community creates more microhabitats for the preferences of more species.

Figure 18: Aquatic Ecosystem Web



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MANAGEMENT RECOMMENDATIONS

1) Natural shoreline restoration is much needed at Parker Lake. Disturbed shorelines cover too much of the current shoreline, especially with many buildings less than 50 feet from the ordinary high water mark and a number of easily-eroded sand beaches also found. A buffer area of native plants should be restored around the lake, especially on those sites that now have traditional lawns mowed to the water's edge or buildings very close to the water's edge.

2) No lawn chemicals should be used on properties around the lake. If they must be used, they should be used no closer than 50 feet to the shore.

3) The aquatic plant management plan that was developed as part of the lake management plan needs to be revised to cover recurrence of Eurasian watermilfoil, curly-leaf pondweed, or any new invasives, including a potential hybrid of Eurasian watermilfoil and Northern milfoil. The lake management plan was submitted 2 years ago to the Wisconsin Department of Natural Resources, but approval has not yet been granted.

4) If invasives recur or hybrid milfoil is verified, the Parker Lake Association should apply for grants from the Wisconsin Department of Natural Resources to help defray the cost of aquatic plant management.

5) No broad-scale chemical treatments of native aquatic plant growth are recommended due to the undesirable side-effects of such treatments, including increased nutrients from decaying plant material and decreased dissolved oxygen and opening up more areas to the invasion of EWM.

6) Fallen trees should be left at the shoreline.

7) Parker Lake residents should continue to be involved in the Wisconsin Self-Help Monitoring Program to permit on-going monitoring of the lake trends for basically no cost. This should include monitoring for known invasives and a possible hybrid milfoil.

8) Parker Lake residents should identify, cooperate with and participate in watershed programs that will reduce nutrient and sediment inputs.

9) Emergent vegetation and lily pad beds should be protected where it is currently present and re-established where it is not. These not only provide habitat, but also help stabilize the sandy shores.

10) Shore areas where there is undisturbed wooded shore should be maintained & left undisturbed.

11) Once the lake management plan has been approved by the WDNR, the Parker Lake Association should develop and implement a lake management plan that takes into account all inputs from both the surface and ground watersheds and addresses the concerns of this lake community.

12) The Parker Lake Association, with the assistance of the Adams County Land & Water Conservation Department, the Adams County Highway Department, the Wisconsin Department of Transportation and the Town of Jackson should develop and implement protective measures to reduced runoff from State Highway 82 and local road 3rd Avenue into Parker Lake.

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